A

Synopsis

On

"Sustainable Enhancement of Banana through Integrated Pest Management in Begusarai District"

(For the Ph.D. Degree in the Faculty of Science)
[Botany]

Submitted to

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Synopsis

Introduction:

Banana (*Musa paradisiaca* L) is one of the most important fruit crops globally, serving as a staple food and source of income for millions of people. However, banana production faces numerous challenges, including the impact of pests and diseases, which can lead to significant yield losses and reduced economic returns for growers. Conventional pest management practices often rely heavily on chemical pesticides, which can have adverse effects on the environment, human health, and ecosystem resilience.

Begusarai district is one of the thirty-eight districts of Bihar state, India. The district lies on the northern bank of the river Ganga. It is located at Latitudes 25.15°N & 25.45°N and longitudes 85.45°E & 86.36°E.

The agriculture in Begusarai district predominantly revolves around banana farming, which is a major source of income for local farmers. However, the region faces challenges as adverse disease severity in banana crops often leads to significant economic losses for the farmers, affecting their livelihoods and the local economy.

Therefore, there is an urgent need to develop sustainable and integrated pest management (IPM) strategies to mitigate the impact of pests and diseases on banana production while ensuring environmental and economic sustainability.

This research is expected to contribute to the development and adoption of sustainable pest management practices in banana cultivation, leading to:

1. Reductions in pesticide use and associated environmental risks.
2. Increased resilience of banana production systems to pests and diseases.
3. Improved economic returns and livelihoods for banana growers.
4. Enhanced sustainability and resilience of banana production systems in the face of environmental and socio-economic challenges.

Objectives:

The objective of this research is to enhance sustainable banana production through the development and implementation of integrated pest management strategies. Specifically, the study aims to:

1. To assess the prevalence and distribution of key pests and diseases affecting banana cultivation.

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2. To evaluate the efficacy of various IPM components, including host plant resistance, biological control, cultural practices, and chemical control, in managing banana pests and diseases.
3. To investigate the socio-economic impacts and feasibility of adopting IPM strategies among banana growers.
4. To develop and disseminate practical recommendations and extension materials
5. To promote the adoption of sustainable pest management practices in banana production systems.

Review of Literature:

Banana cultivation is severely affected by various pests and diseases, including Fusarium wilt (Panama disease), Black Sigatoka, Banana Bunchy Top Virus, and various nematode species (Ploetz, 2015; Dita *et al.*, 2018).

Traditional pest management approaches relying solely on chemical pesticides have shown limited effectiveness and have led to environmental contamination, pesticide resistance, and negative health impacts (Gómez-Lama Cabanás *et al.*, 2020).

Integrated pest management (IPM) offers a holistic and sustainable approach to pest management, emphasizing the integration of multiple tactics to suppress pest populations while minimizing environmental risks and economic costs (Gurr *et al.*, 2017).

Key components of IPM include host plant resistance, biological control using natural enemies, cultural practices such as sanitation and crop rotation, and judicious use of chemical pesticides (Kumar *et al.*, 2019).

Recent studies have highlighted the potential of IPM strategies in enhancing banana production sustainability by reducing pesticide dependency, conserving natural resources, and improving farmer livelihoods (Santos *et al.*, 2021; Selvarajan *et al.*, 2022).

Plan of Works:

1. To conduct field surveys to assess the prevalence and severity of banana pests and diseases in selected production areas.
2. To implement field trials to evaluate the efficacy of host plant resistance, biological control agents, cultural practices, and chemical pesticides in managing banana pests and diseases.

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3. To administer surveys and interviews to assess the socio-economic impacts and adoption rates of IPM practices among banana growers.
4. To develop extension materials, training workshops, and farmer field schools.
5. To promote the adoption of sustainable pest management practices in banana production systems.

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